

What is claimed is:

1. A method for continuously heat treating a double tapered steel wire (S), characterized by comprising the steps of:

continuously detecting a diameter of said steel wire (S) in
5 heat treatments of said steel wire (S), wherein said steel wire (S) has its constant diameter straight portion (21, 24) disposed between its opposite tapered end portions (22, 23) in its longitudinal direction, wherein said opposite end portions (22, 23) are tapered down to their outer reduced-diameter ends;

10 controlling the amount of energy of induction heating supplied to said steel wire (S), wherein the amount of said energy is proportional to a wire diameter of said steel wire (S) having been detected;

whereby said steel wire (S) is evenly heat treated over the
15 entire length of said steel wire (S).

2. A double tapered steel wire (S) characterized by comprising:

a straight portion (21, 24) with a constant diameter;

opposite tapered portions (22, 23) disposed adjacent opposite
20 ends of said straight portion (21, 24), wherein said tapered portions (22, 23) are tapered down to their reduced-diameter outer ends;

wherein said steel wire (S) is heat treated using induction
heating in a manner such that said steel wire (S) has its
25 small-diameter portions (24) be substantially equal to its large-diameter portion (21) in tensile strength.

3. An apparatus for continuously heat treating a double tapered

steel wire (S), wherein the steel wire (S) is provided with a constant-diameter straight portion (21, 24) and a pair of opposite tapered portions (22, 23) disposed adjacent to opposite ends of said straight portion (21, 24), wherein said tapered portions (22, 5 23) are tapered down to their reduced-diameter outer ends, the apparatus being characterized by comprising:

an induction heating means (4, 7) for continuously heating said steel wire (S);

10 a wire diameter detection means (3, 6) for continuously detecting a diameter of said steel wire (S); and

15 a control means (12) for controlling the amount of energy supplied to said induction heating means (4, 7) in a manner such that said steel wire (S) has its individual portions (21-24) heated to individual predetermined temperatures over the entire length of said steel wire (S), wherein the amount of said energy supplied to said induction heating means (4, 7) is proportional to a wire diameter of said steel wire (S) having been detected by said wire diameter detection means (3, 6).

20 4. The apparatus for continuously heat treating the double tapered steel wire (S) according to claim 3, characterized by further comprising a quenching means and a tempering means, wherein said quenching means and said tempering means are arranged in tandem to have said steel wire (S) be continuously subjected to a quenching 25 process and a tempering process in this order.

5. The apparatus for continuously heat treating the double tapered steel wire (S) according to claim 5 or 6, characterized in that said double tapered steel wire (S) is provided with: a

plurality of straight portions (21, 24) each with a constant diameter; and, a plurality of tapered portions (22, 23) which are spaced alternately with said straight portions (21, 24) in a longitudinal direction of said double tapered steel wire (S).